

# Copeland Scroll Digital VRF Air Conditioning Saves Precious Energy for International Copper Office, Mumbai

## Results

- 31% annual kWh energy saving proved by Energy audit and three year energy bill comparison
- Improved human comfort and working environment
- Intangible benefits like aesthetic & sound performance improvement

## Technology and services

- The Digital Scroll VRF Air conditioner was designed, manufactured, installed and commissioned by Blue Star Limited, one of the key OEM partners of Emerson in India
- Copeland Scroll Digital compressor is used in the VRF AC
- Transition to environment friendly R410A refrigerant from existing R22 AC system

## Application

Replacing seven R22 Split Air conditioners of 1.5TR and 2TR capacity with single 12HP R410A Digital Scroll VRF AC at International Copper office at Mumbai.

## Customer

The International Copper Promotion Council (India), (ICPCI), Powai, Mumbai is the Indian centre of the International Copper Association Limited, a leading organization for the promotion of copper world wide. ICPCI's principal objective is "to promote the beneficial usage of copper for safety, health, environment and energy savings." This is done by implementing programmes and initiating and funding projects in copper technology, research and market development. and made it difficult to install additional showcases for expansion.



## Challenge

The seven Split ACs used at ICPCI could not maintain comfort conditions in the office, even though they were under annual maintenance contract with a dealer of a reputed brand. The office staffs were complaining about the poor comfort conditions in the office. The electrical power supply to ICPCI, Powai, Mumbai office is provided by a private electrical company, under LT2 tariff. With escalating electricity tariff charges, the annual spend on AC energy consumption was increasing.

ICPCI discussed the issue with Emerson and decided to switch over to the latest technology Digital Scroll VRF AC system to improve the office comfort conditions and to reduce the energy bill. ICPCI wanted to verify the energy savings and improvement in comfort conditions and assigned auditing work on comfort improvements and energy savings, pre & post Digital scroll VRF installation to TERI.

## Solution

ICPCI got a base line energy audit conducted by TERI in April 2008. The temperature, % RH, power measurements, and the comfort feelings of employees were also recorded.

With the involvement of Blue Star sales team and technical team, a 12HP, R410A, Digital Scroll VRF unit Model BVRF-12TCE was installed and commissioned in May 2008. This 12HP outdoor unit is connected to eight different indoor units of wall mounted & cassettes type units with different cooling capacity.

The energy saving potential of Digital scroll VRF was proved in the post energy audit conducted by TERI in August 2009, after successful operation of the AC system for 12 months by ICPCI. Comparison of energy bills paid by ICPCI, Mumbai office over a period of June 2006 (before Digital scroll VRF installation) to May 2009 (one year after installation) proved reduction energy consumption in kWh by 31% on annual basis and realised energy cost saving of 38%. Difference in percentage savings for energy (kWh) and cost savings (Rupees) is due to change in tariff From Rs.8.50 to Rs.9.40 per kWh.

The comfort conditions inside the office greatly improved to the satisfaction of ICPCI employees, as the electronic control system of Digital scroll VRF monitors the usage and load conditions of each Indoor unit every few seconds and modulates the capacity output of the outdoor unit over 10% to 100%. It also allows different rooms to be set at different temperatures, as per user requirement, and maintains it within +0.5°C.

The Digital scroll VRF AC provides many intangible benefits like improvement in aesthetics, savings in floor space for outdoor unit, low sound performance, flexibility in using different types and capacities of Indoor unit etc., as experienced by ICPCI.

Overall the retrofit project experience and benefits are well appreciated and considered as a true value for investment by ICPCI. Mr. Manas Kundu of ICPCI aptly sums this up, "We evaluated different options available to us to improve the employees comfort and to reduce the Air conditioning energy bill. The results over more than a year now have vindicated that our decision to invest in a Digital VRF AC system was the right one, even though the first cost was higher than other options'.

In India, different OEM partners of Emerson like Blue Star, Samsung, Voltas and York offer Digital VRF AC systems and significantly contribute in saving precious energy and environment by creating hundreds of success stories like the ICPCI, Mumbai site.

	Before modification	After modification
Total AC capacity	11.5TR	10.0 TR (12HP)
No. of indoor units	7	8
Refrigerant	HCFC22	HFC410A
Type of AC system	Individual split AC	Multi indoor central VRF
Aesthetics	Baseline	Great improvement
Outdoor unit foot print	Baseline	Drastically reduced
Outdoor unit sound	Baseline	Drastically reduced
Temperature control	Set point + 2- 3°C	Set point +0.5°C
Energy saving	Baseline	31% kWh annually
Inside comfort	Not good	Vast improvement

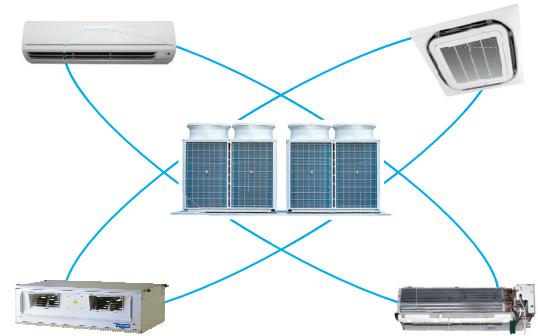


Table 12 Month-wise electricity consumption for last three years

Sl. no.	Month	Total consumption, kWh	Month	Total consumption, kWh	Month	Total consumption, kWh
1	May-09	1,956	May-08	1,824	May-07	4,811
2	Apr-09	1,864	Apr-08	2,402	Apr-07	4,178
3	Mar-09	1,854	Mar-08	2,201	Mar-07	4,142
4	Feb-09	1,704	Feb-08	1,799	Feb-07	3,406
5	Jan-09	1,745	Jan-08	1,260	Jan-07	3,425
6	Dec-08	1,450	Dec-07	1,814	Dec-06	3,205
7	Nov-08	1,717	Nov-07	2,649	Nov-06	4,108
8	Oct-08	1,659	Oct-07	3,501	Oct-06	4,525
9	Sep-08	1,719	Sep-07	3,368	Sep-06	3,851
10	Aug-08	1,824	Aug-07	2,758	Aug-06	2,513
11	July-08	1,851	July-07	3,699	July-06	2,688
12	Jun-08	1,895	Jun-07	3,811	Jun-06	4,097
Total		21,238	31,086		44,949	

Table 13 Month-wise energy bill amount for last three years

Sl. no.	Month	Energy bill (RS)	Month	Energy bill (RS)	Month	Energy bill (RS)
1	May-09	16,291	May-08	16,610	May-07	45,137
2	Apr-09	15,535	Apr-08	22,570	Apr-07	35,883
3	Mar-09	16,211	Mar-08	20,010	Mar-07	27,012
4	Feb-09	15,357	Feb-08	17,090	Feb-07	23,482
5	Jan-09	15,721	Jan-08	11,011	Jan-07	23,633
6	Dec-08	13,102	Dec-07	16,583	Dec-06	22,840
7	Nov-08	15,473	Nov-07	25,106	Nov-06	29,230
8	Oct-08	13,720	Oct-07	33,802	Oct-06	46,497
9	Sep-08	14,344	Sep-07	32,445	Sep-06	24,836
10	Aug-08	15,207	Aug-07	25,553	Aug-06	15,814
11	July-08	15,429	July-07	34,889	July-06	16,994
12	Jun-08	14,770	Jun-07	36,507	Jun-06	26,130
Total		181,160	292,176		337,488	

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